PREVALENCE OF MALARIA IN DIFFERENT HOSPITALS OF DISTRICT MARDAN

BY

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A Master's Report submitted to the Department of Microbiology, Abasyn University Peshawar in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MICROBIOLOGY

DEPARTMENT OF MICROBIOLOGY
ABASYN UNIVERSITY PESHAWAR
OCTOBER 2014

LIST OF ABBREVIATIONS

%	Percentage
<	More Than
<	Less Than
ACPR	Adequate Clinical Parasital Response
AL	Arthemether-Lamefuntrine
CQR	Chloroquine Resistance
DHQ	District Head Quarter
EDO	Education Development Officer
EPI	Expanded Programme on Immunization
FATA	Federally Administer Tribal Areas
IPT	Intermittent Preventive Treatment
ITN	Insecticide Treated Nets
MLT	Medical Lab Technology
MMC	Mardan Medical Complex
MOD	Multiple Organ Center
NIH	National Institute of Health
NMCP	National Malaria Control Programme
PCR	Polymerase Chain Reaction
PIMC	Pak International Medical College
PRL	Provincial Reference Laboratory
RBM	Roll Back Malaria
RHC	Rural Health Center
RMO	Resident Medical Officer
THQ	Tehsil Head Quarter

UNDP	United Nations Development Programme
UNICEF	United Nations children's Fund
USPS	United States Postal Service
WHA	World Health Assembly
WHO	World Health Organization

ACKNOWLEDGEMENT

Starting with the name of ALLAH the most merciful and beneficent .I am thankful to my dear ALMIGHTY ALLAH of HIS countless blessings upon me.

I am cordially thankful to my supervisor Ms.Zobia Afsheen, Head of Microbiology Department, Abasyn University Peshawar for her Permission to allow me for research work, guidance and providing me facilities for completion of my laboratory work.

I am also thankful to Dr.Noor Islam (DMLO in D.H.Q Mardan),Dr.Javid Iqbal (RMO in Mardan Medical Complex),Dr.Karim (lab incharge), Mr.Tehseenullah (labincharge in D.H.Q Mardan) and M.Ilyas and Mansoor (lab technetion in T.H.Q) for providing me every facility for practical work at Laboratory.

I am also oblidged to my class fellow M.Iqbal (BS MLT NIH) and Akif who guide me a lot in my research work.

At last I am thankful to my family members, especially my cousin Umair Islam (M.B.B.S 3rd year PIMC) and my brother Saidullah(pathologist) who provide me malaria research paper and other information. And once again I am thankful to my family members especially my loving and sweet mother who is an infinite source of DUA for me .She prayed a lot for my success. .I am also very much thankful to my elder brothers Yousaf khan and Ikram khan for their support with me.

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Session: 2014

ABSTRACT

Malaria is a systematic vector- borne disease, where a female anopheles mosquito acts as the vector that transmits the disease. It is caused by infection of the red blood cells with intracellular protozoan parasites of the genus *Plasmodium*. Severe malaria is almost exclusively caused by *Plasmodium falciparum*. Malaria is the second fatal disease in the world. The infectious disease infects more than 300 million peoples a year.Malarial parasites were identified in the blood slides of suspected patients of the disease from May to August 2014.Inthis study from pathology Department Mardan Medical Complex and D.H.Q Mardan and T.H.Q Takhtbhai 350 blood samples were collected, their thick and thin smears were made for microscopy.Outof 350 samples 60 were found positive for malarial Parasites showed a prevalence rate of 17.1% in district Mardan. Out of 60 positive samples, *Plasmodium vivax* wasfound 57(95.3%), while the remaining 3(4.6%) were found *P.falciparum*.Gender wise distribution of malaria shows a prevalence rate of 31(52%) in males and in females 29(48%). In order to effectively develop preventing method policies, a thorough

understanding of factors contributing to possession and use are critical.Government should focus the malaria problem of district mardan.

INTRODUCTION

Malaria is a mosquito borne disease caused by protozoan parasites *Plasmodium*. It threatens millions of people globally. Out of the five *Plasmodium* species infecting man, two species *Plasmodium falciparum* and *Plasmodium vivax* are accountable for the bulk of the global burden of human malaria. *P.vivax* malaria is often known as benign tertian malaria. But it is incorrectly assumed to be benign because it is acute and severe. A person with *P.vivax* malaria experiences paroxysms of high fever, chills, headache, fatigue, and musculoskeletal pain (Sarwat Naz,2013).

Four Species of Malaria Parasite, Members of a Genus of Protozoa within the Suborder Haemosporidiidea, Infect humans, and all are spread by female Anopheles Mosquitoes. In practice, only one of these parasites, *P.falciparum*, causes fatal disease the pathogenesis of the more clinical aspects of *P.falciparum* malaria, such as hyperlactatemia, metabolic acidosis, hypoglycemia, respiratory distress, impaired consciousness, and anemia, has been reviewed recently (Ian A. Clark et al., 2004).

Our understanding of the malaria parasites begins in 1880 with the discovery of the parasites in the blood of malaria patients by Alphonse Laveran. The sexual stages in the blood were discovered by William McCollum in birds infected with a related haematozoan, Haemoproteuscolumbae, in 1897 and the whole of the transmission cycle in culicine mosquitoes and birds infected with *Plasmodium* relictum was elucidated by Ronald Ross in 1897. The discovery that malaria parasites developed in the liver before entering the blood stream was made by Henry Shortt and Cyril Graham in 1948 and the final stage in the life cycle, the presence of dormant stages in the liver, was conclusively demonstrated in 1982 by Wojciech Krotoski (Francis, 2010).

Malaria remains extremely burdensome, causing about 2 million deaths annually. However, malaria is almost exclusively a Problem of the geographical tropics. About 40% of the world's population remainsat risk for infection, of whom 19% live in Africa; in addition, about 90% of clinical malaria cases occur in sub-Saharan (Amar Hamoudi and Jeffrey D. Sachs,1999).

Preventive measures can be effective in limiting the mortality and morbidity associated with malaria. Mosquito bites can be avoided by use of appropriate environmental control and use of protective clothing, bed nets, repellents, and insecticide. Chemoprophylaxis is a mainstay of malaria prevention, and new, effective agents are increasingly available. Rapid, accurate diagnosis and effective medical treatment can help people who become ill with malaria despite their preventive efforts (Philip R. Fischer and Ralf Bialek, 2014).

Plasmodium invade liver hepatocytes where they undergo a phase of asexual multiplication (Exoerythrocyticschizogony) resulting in the production of many uninucleate merozoites. These merozoites flood out into the blood and invade red blood cells where they initiate a second phase of asexual multiplication (erythrocyticschizogony) resulting in the production of about 8-16 merozoites which invade new red blood cells. This process is repeated almost indefinitely and is responsible for the disease, malaria. As the infection progresses, some young merozoites develop into male and female gametocytes that circulate in the peripheral blood until they are taken up by a female anopheles mosquito when it feeds. Within the mosquito the gametocytes mature into male and female gametes, fertilization occurs and a motile zygote (ookinete) is formed within the lumen of the mosquito gut, the beginning of a process known as sporogony. The ookinetepenetrates the gut wall and becomes a conspicuous oocyst with in which another phase of multiplication occurs resulting in the formation of sporozoites that migrate to the sali-vary glands of a mosquito and are injected when the mosquito feeds on a new host. (Francis, 2010).Period between enterance of sporozoite into human body and onset of fever is called incubation period, which varies with different species like *P. vivax*10 – 14 days, *P.malariae* 18 days – 6 weeks, *P.ovale.*10 – 14 days, *P.falciparum*10 – 14 days (Dr. Shahid Anwar, 2011).

Simple malaria can be treated with oral medications. The use for *Plasmodium falciparum* infection is artimisinins which decreases the capacity of the parasite to give resistance to any single drug component (Kokwaro., 2009). For the treatment of malaria in pregnant women, the WHO recommends the use of quinine plus clindamycin in the early trimester (Fairhurst et al., 2012).

Infection caused by *Plasmodium vivax*,*Plasmodium ovale* or *Plasmodium malariae* is usually treated on the basis of outpatient (Waters and Edstein, 2012).

Malaria control effort in 1955, World Health Assembly Launched a global malaria removal campaign. This campaign was about the use of DDT (insecticide spray used to kill mosquitoes) which was removing the disease before it cause infection. The malaria campaign got about $20 million between 1956 and 1963. By the 1960s, the resistance of mosquitoes to DDT start to emerge and the World Health Assembly instituted a revised strategy in which countries should work to remove malaria (Basch., 1999 and Arata, 2005).The world health organization in 1992 developed a new direction to control malaria in 1998, Roll Back malaria (RBM) was established by the world health organization (WHO) , the united nations children'sfound (UNICEF), the united nations development programme(UNDP), and the world Band in order to meet all features of the disease (Basch,1999).

Aims and objectives

Keeping in view different aspects of diseases, the study was designed with the following aims and objectives.

- To determine the Prevalence of malaria in District Mardan.
- To identify species wise distribution of malaria among males & females of different age groups.

REVIEW OF LITERATURE

Muhammad Iqbal Yasinzai et al., 2009 investigated the incidence of malarial infections in human population in 20 localities of district Bolan, Baluchistan, Pakistan. Malarial parasites were identified in the blood slides of suspected patients of the disease from July, 2004 to June, 2006. Out of 3709 suspected cases of malaria, 38.9% were found to be positive for malarial parasite. Out of positive cases, 86.2% were identified as *Plasmodium vivax* infection, 13.7% cases with *P.falciparum*. However, seasonal variation was also noted in Bolan area with the highest (91.4%) infection of *P.vivax* in December and lowest (71.4%)in January, while infection of *P.falciparum* was the highest (28.5%) in January and lowest (8.5%) in the month of December. Infection in males was 75.5% and in females was 24.4%.

Hussain Khan et al., 2006 conducted a cross-sectional in the Department of Medicine, Gomal Medical College,D. I. Khan, from 28th August 2005 to 27th February2006. All adult patients presenting to the outpatient clinic with fever as a chief complaint, were included in the study. Four hundred and ninety patients presented with fever as a chief complaint during the study period. Out of these, 98 (20%) were found positive for malaria, seventy-five (76.53%) males and 23(23.46%)

females. The average age of positive cases was 27.28 years, with an average age of 26.52 years in case of males and 29.86 for females.

Arbab Ali Junejo., et al 2012 investigated for malarial parasite and its species in hospitalized Children, who were clinically suspected as malaria. Descriptive. Study: This is hospital based retrospective study conducted at Children hospital Chandka Medical College Larkana from Jan 2008 to Dec 2008. Files of patients who were clinically diagnosed as malaria according to World Health Organization/ National Malaria Program were reviewed. Data regarding age, sex and malarial parasites and their species was collected. Data was analyzed by using SPSS version 15 for windows and results were presented as frequency tables, Charts and Graphs. : Two patients were clinically suspected as malaria. Majority of patients 139(69.5%) were between five to twelve years. There was male predominance 117(58.5%). Malaria parasites were seen in 73(36.5%), *Plasmodium,P.vivax*was seen in majority 43(58.9%) of cases, *P.falciparum*was seen in 30(41.09%), there was no case of *Plasmodium malairae* or *Plasmodium ovale*. Majority of patients 196(98%) improved and were discharged, 04(2%) patients died: Out of 200 clinically suspected cases of malaria, 73(36.5%) were malarial parasite positive, *Plasmodium falciparum* was predominant specie.

Lagerberg et al., 2008 described that pregnant women are more likely than non-pregnant women to become infected with malaria and to have severe infection. The effects of malaria during pregnancy include spontaneous abortion, preterm delivery, low birth weight, stillbirth, congenital infection, and maternal death. Malaria is caused by the four species of the protozoa of the genus *Plasmodium*, which is transmitted by the bite of the female Anopheles mosquito, congenitally, or through exposure to infected blood products. This article reviews the epidemiology, pathology, clinical symptoms, diagnosis, and treatment of malaria in pregnant women. Interventions to prevent malaria include intermittent preventive treatment, insecticide-treated nets, and case management of malaria infection and anemia.

Staid Jamil et al., 2012 conducted a study to determine the variation in frequency of *Plasmodium vivax* and *Plasmodium falciparum* malaria in different seasons of the year in Khyber Teaching Hospital, Peshawar. Out of total 411 diagnosed malaria cases, total 134 (32.60%) presented in the autumn season (*vivax*=33.58%, and *falciparum*=66.42%), 37 (9%) in winter season (*vivax*=32.4%, and*falciparum*=67.6%), 76 (18.49%) in spring season (*vivax*=93.4% and *falciparum* 6.6%) and 164(39.90%) in summer season (*vivax*=89.6, and *falciparum*=10.4%). The malaria showed a highly significant pattern in different seasons of the year (p=0.00) in a way that *Plasmodium*

*falciparum*malaria reached its highest frequency in autumn and winter seasons while *Plasmodium vivax*malaria reached its peak frequency in spring and summer seasons.

Mehran Qayum et al., 2012the descriptive cross-sectional study was conducted in Jalozai from March to November 2010. More than two-fifth (42%, n=49) of the study population was unaware of malaria, while more than three fifth (70%, n=76) was ignorant of the preventive strategies. The study found that the surveyed population (55%, n=64) had access to health education on diseases caused by mosquitoes but less than half of them (44%, n=28) reported that health education included preventive strategies against malaria. Health education was done at community (40%) and household levels (60%). Simple Bed Nets were given to 68% (n=78), while 26 (32%) families reported that the nets providers were not in a useable state. No education on the proper usage of bed nets was available, and replacement of the nets was not noticed. Health education programmes should include preventive methods.

Saba Ahmed et al., 2012 performed a studyat at Civil Hospital Karachi from September 2011 to January2012.Various clinical features and laboratory parameters were analyzed according to WHO guidelines and treatment failure to anti-malarial drugs was recorded. Mean frequencies, percentages and chi-square test were used for analysis. Statistical significance was defined as p-value <0.05. Total of 81 patients were enrolled in the study. Mean age of children was 5.5 ± 3.4 years. Type of malaria infections that were seen included *P.falciparum* 46(57%), mixed infection 26(32%) and *P.vivax* 9(11%). Frequent clinical features included splenomegaly (74%), multiple organ dysfunction (MOD) (70%), cerebral malaria (31%) and malnutrition (27%). Thrombocytopenia (86%) and severe anemia (42%) were the common laboratory findings. Shock (p<0.001), renal failure (p<0.001), hepatic involvement (p<0.002) and cerebral malaria (p<0.002) emerged as strong predictors of complications. Fourteen out of 81 cases showed early treatment failure to Quinine. Shock, renal failure, hepatic involvement and cerebral malaria are strongly associated with complications in severe malaria. MOD and malnutrition were identified as significant new clinical features present in severe malaria in this study.

In a study by Naheed Ali and Syed BasitRasheed., 2009 collection was done from four different localities viz. Hayatabad, LalazarColony,Malakander and Ittehad Colony in Peshawar. A total of 15083 individuals were collected which included 7382males, 7700 females and one gynandromorph, belonging to two genera *Culex*and *Anopheles*. More than 99% of the collected larvae and *pupae* belonged to the genus *Culex* with three species, *viz. Cx. pipiensquinquefasciatus*: the most

abundant species, *Cx. tritaeniorhynchus* and *Cx. vishnui* occupying the same habitat and occurring in May, June and October while the genus *Anopheles* was found to contain six species viz. An. *Nigerimus*(collected in April), An. subpictus, An. *culicifacies*, An. *fluviatilis*, An. maculates (collected in October) and An.stephensi (found both in April and October).

Saif Ullah et al.,2012 determined the efficacy of Arthemether-Lamefuntrine (AL) in patients with malaria.Study was conducted in Medical Unit DHQ Hospital Sargodha and Medical Unit V, DHQ Hospital Faisalabad from 1stJanuary 2011 to 30 June 2011. Total 129 adult patients both male and female diagnosed to have malaria both on clinical and laboratory examination were included in the study. Patients were given AL (20/120) 2 tablets 12 hourly for three days. An adequate clinical and parasitological response (ACPR) was defined as absence of fever and parasitaemia (negative slide for malarial parasite) by day 45 after end of treatment. Out of 129 patient's adequate response (ACPR) was seen in 122 patients with efficacy of94.6%. AL is an important and effective treatment option for treatment of patients with malaria.

Hussain Khan et al., 2006 conducted cross-sectional study in the Department of Medicine, Gomal Medical College,D. I. Khan, from 28th August 2005 to 27th February2006. All adult patients presenting to the outpatient clinic with fever as a chief complaint, were included in the study. Four hundred and ninety patients presented with fever as a chief complaint during the study period. Out of these, 98 (20%) were found positive for malaria, seventy-five (76.53%) males and 23(23.46%) females. The average age of positive cases was 27.28 years, with an average age of26.52 years in case of males and 29.86 for females.

Sarwat Naz et al., 2013 these studies were undertaken to evaluate the insecticidal effect of ivermectin, on the survivorship of zoophilic malaria vectors *Anopheles culicifacies* and A. stephensi under field conditions of (district Okara) Punjab, Pakistan *Anopheles* mosquitoes were sampled on cattle given ivermectin treatment. Insecticidal effect of ivermectin on the survivorship of *A.culicifacies*and *A.stephensi* was monitored for 12 days post blood feeding. In conclusion, ivermectin in a dose appropriate for cattle use led to a significant reduction in both *A.culicifacies* and *A.stephensi* survival when they fed on treated cattle, compared with controls. *A.stephensi* was found more susceptible than *A.culicifacies*toivermectin after feeding on treated cattle and insecticidal effect was observed for 28 day post ivermectin treatment.

Shahid Niaz Khan et al., 2013 this study was aimed to know the burden of malaria infection and to re-evaluate its high prevalence in general population of Bannu District. **:** Out of 823 blood

samples, 223(27.1%) subjects were found positive for *Plasmodia* is, while the distribution of species prevalence was observed as 186 (22.6%) and 25 (3.04%) for *Plasmodium vivax,* and *Plasmodium falciparum,* respectively along with a mixed infection of 12(1.46%). Variation with high incidence (42.65%) was found in the age group of 21-30 years.

Arbab Ali Junejo et al., 2012 studied to look for malarial parasite and its species in hospitalized Children, who were clinically suspected as malaria. Data regarding age, sex and malarial parasites and their species was collected. Data was analyzed by using SPSS version 15 for windows and results were presented as frequency tables, Charts and Graphs. Two patients were clinically suspected as malaria. Majority of patients 139(69.5%) were between five to twelve years. There was male predominance 117(58.5%). Malaria parasites were seen in 73(36.5%), *Plasmodium*, *P.falciparum* was seen in majority 43(58.9%) ofcases,*P.vivax*was seen in 30(41.09%), there was no case of *Plasmodium malairae* or *Plasmodium ovale*. Majority of patients 196(98%) improved and were discharged, 04(2%) patientsdied. Out of 200 clinically suspected cases of malaria, 73(36.5%) were malarial parasite positive, *P.falciparum* was predominant specie.

Kamini Mendis et al., 2009 studied that malaria requires a re-orientation of control activity, moving away from a population-based coverage of interventions, to one based on a programme of effective surveillance and response. Sustained efforts will be required to prevent the resurgence of malaria from where it is eliminated. Eliminating malaria from countries where the intensity of transmission is high and stable such as in tropical Africa will require more potent tools and stronger health systems than are available today. Malaria control and elimination are under the constant threat of the parasite and vector mosquito developing resistance to medicines and insecticides, which are the cornerstones of current antimalarial interventions. The prospects of malaria eradication, therefore, rest heavily on the outcomes of research and development for new and improved tools. Malaria control and elimination are complementary.

Pari (1981) worked on the prevalence of malaria among primary school children of Mardan District and reported 16% of malarial infection. The prevalence of malaria observed by Shah (2003) among students of religious schools (Madaris) of Bannu District was 3.61%. In 2003 Karim observed the prevalence of malaria among school children in rural areas of Bannu District, and reported 3.05% of malarial infection.

Sha Sahar et al., 2012 this study was conducted from November-2008 to October-2010 in a high malaria-hit district Muzaffargarh. The overall reported cases at RHC included 10,028 suspected

malaria cases, of which, 208 were confirmed as *P.falciparum* patients. It was made out that malaria cases reported in age group (16-30) years were significantly higher (P<0.001), among which males were victimized significantly more (P<0.001) than the females. The overall *P.falciparum* positivity rate throughout the survey interval was 2.07%. It was 0.47% in the 1st year of the research, while in the 2nd year it increased significantly (P<0.001) and reached to 2.69%. This rapid increase was caused by the heavy floods hitting Punjab during the research span.

MATERIALS AND METHODS

3.1 PLACE OF SAMPLE COLLECTION AND ANALYSIS

A total number of 350 blood samples were collected from T.H.Q Takht bhai, D.H.Q Mardan and Mardan Medical Complex. This collection was carried out from May to August 2014.

3.2 SAMPLING AREA

Blood samples were collected from T.H.Q Takh tbhai, D.H.Q Mardan and Mardan Medical complex. Selection included healthy and diseased individuals having malarial symptoms, visiting to Mardan Medical Complex.

3.3 MATERIALS

Glass slides, sterilized prickers, spirit, microscope and distilled water.

3.4 LABORATORY ACTIVITY

3.5 CHEMICALS

Distilled water, methanol, and Geimsa stain.

3.6 SAMPLING PROCEDURE

The ring finger of the left hand of patient pricked with the help of pricking needle and allows blood to come out .Than I took a clean slide and took 3 drops of the blood on the glass slide, and took another drop of blood at a distance of one cm from the first drop. I used another slide as spreader and made thick smear by joining the 3drops of blood and spreading it in an area of 10mm in diameter. I also made thin smear of blood by bringing the spreader with the drop of blood at an angle of 40-45 degrees from the horizontal and pushing the spreader slowly down the surface of the slide drawing the blood behind and the smear was formed. Then I allowed it to air dry, to become visible for the examination of parasite. Then I brought these samples for checking to the laboratory. There these samples were first dipped in methanol for 2 minutes and Giemsa stain was poured upon it with the help of dropper and stayed for 15 minutes.Geimsa stains was made by the mixing of concentrated Geimsa stain 1ml and water 9ml.

3.7 Microscopy

Blood from individuals having malarial symptoms were used to form thick and thin smears. In thin smear we examine the species of *Plasmodium* while thick smear is used for the detection of the parasite. Slides were then studied for the examination of *Plasmodium* under microscope.

RESULTS

The samples were taken from T.H.Q Takhtbhai, D.H.Q Mardan and M.M.C Mardan with 120,110 and 120 samples respectively.(Figure)4.1 showed a prevalence rate of 31.6% each T.H.Q and M.M.C while in D.H.Q 36.6%.Out of 350 samples, 60 were found positive for *Plasmodium*, showing an overall prevalence of 17.14 % malaria in district Mardan(Table 4.1).

Out of 120 samples of T.H.Q Takhtbhai, only 19 were found positive for *Plasmodium vivax* and none of sample was found for *P.falciparum*. Gender wise prevalence of malaria in T.H.Q showed that 47% males & 53% females suffered with *P.vivax*. Similarly out of 110 samples of D.H.Q, only 26 were found positive for *P.vivax* and 2 were found positive for *P.falciparum*. Gender wise prevalence of malaria in D.H.Q showed that 55% males & 45% females suffered with *P.vivax* and from *P.falciparum*. Similarly from M.M.C 120 samples were taken for *Plasmodium*, out of 120 samples only 18 were found positive for *P.vivax* and only one for *P.falciparum*. Gender wise prevalence of malaria in M.M.C showed that58% males & 42% females suffered with *P.vivax* and*P.falciparum*.

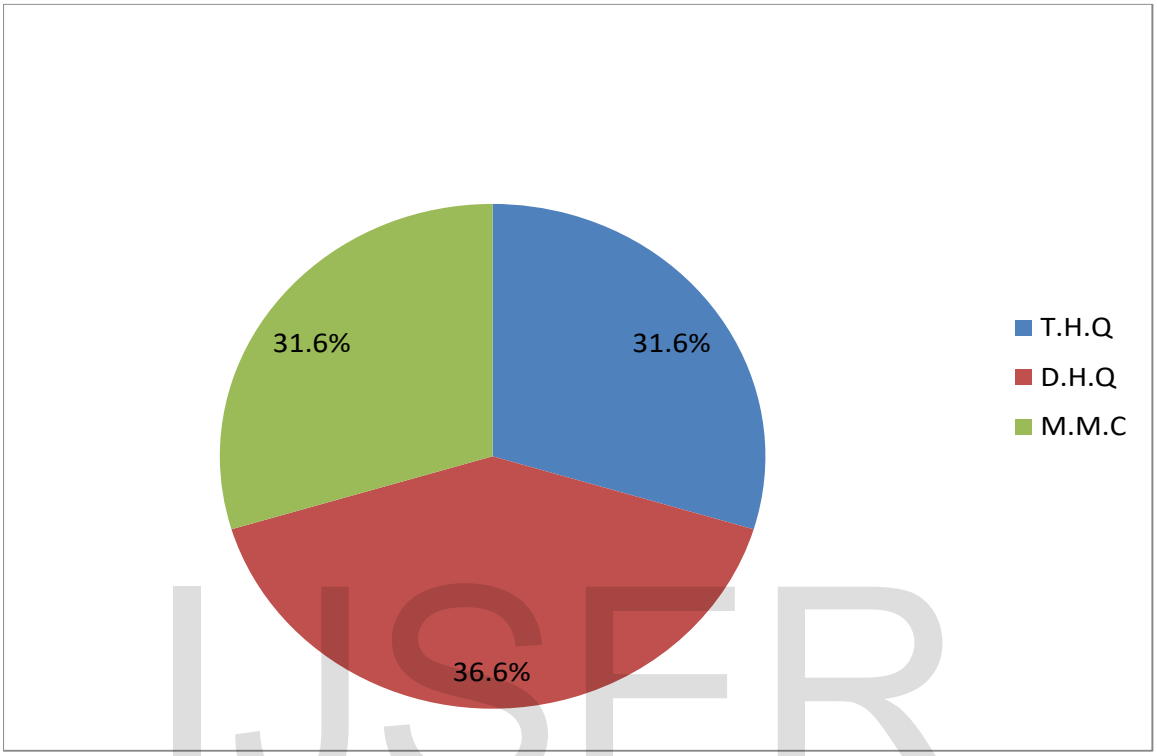

FIGURE 4.1 : Hospitals wise prevalence of malaria

Table 4.1: Prevalence of malaria in different Hospitals in District Mardan

Hospital Name	Examined	Positive	Negative	*P.vivax*	*P.falciparum*	Prevalence
T.H.Q	**120**	**19**	**101**	**19**	**NIL**	**31.6%**
D.H.Q	**110**	**22**	**88**	**20**	**2**	**36.6%**
M.M.C	**120**	**19**	**101**	**18**	**1**	**31.6%**
Total	**350**	**60**	**290**	**57**	**3**	**100%**

(Figure 4.2) showed the species wise distribution of *Plasmodium* in district Mardan. Out of total 60 positive samples, 57(95.30%) were *P.vivax* while only 3(4.60%) were those of *P.falciparum.*

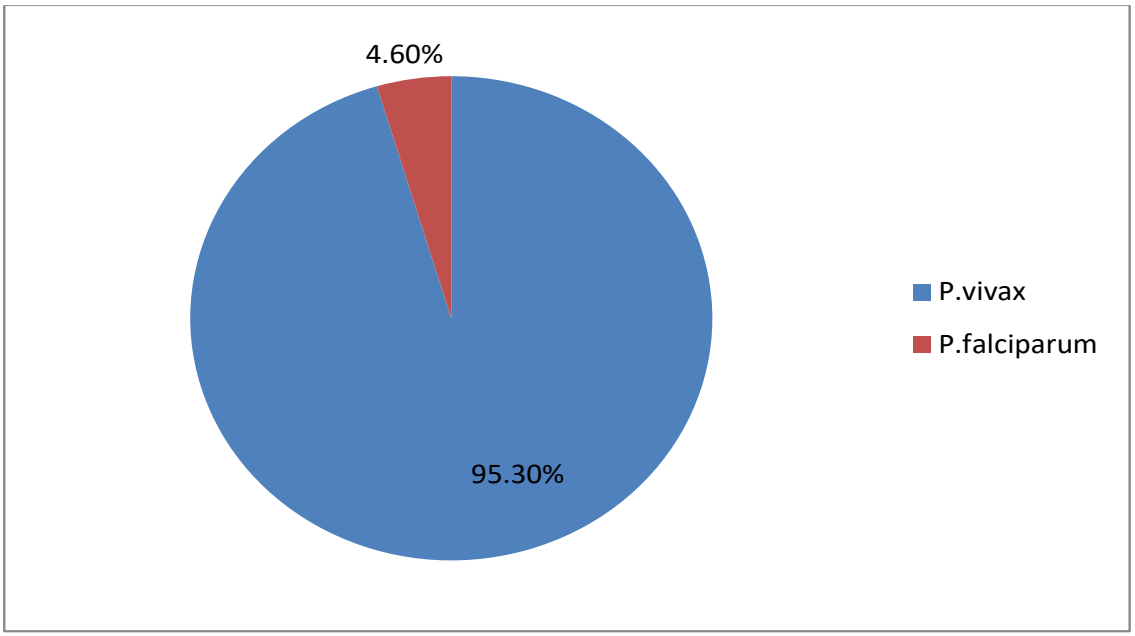

FIGURE 4.2: Prevalence of *P.vivax* And *P.falciparum*

Gender wise distribution of malaria showed that, out of 60 samples only 31(52%) were found positive for males & 29(48%) were found positive for females (Figure 4.3).

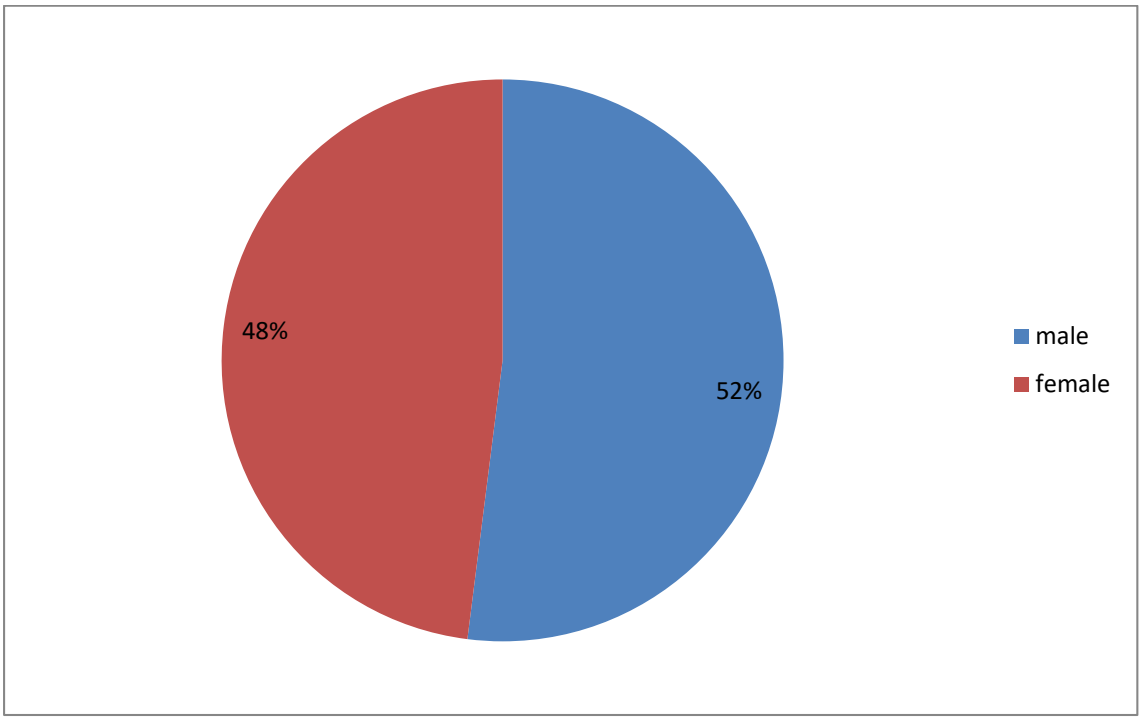

FIGURE 4.3: Gender wise distribution of malaria

Table 4.2: Gender wise disribution of *P.vivax* and *P.falciparum.*

Gender	*P.vivax*	*P.falciparum*	Prevalence
Male	30	1	52%

Female	**27**	**2**	**48%**
Total	**57**	**3**	**100%**

DISCUSSION

In present study prevalence of malaria was observed in different Hospitals of district Mardan. Our study finding showed that out of 350 samples, 60 were positive for malarial parasite showing prevalence of 17.1% malaria in district Mardan.Pari. 1981 worked on the prevalence of malaria among primary school children of Mardan District and reported 16% of malarial infection. The prevalence of malaria observed by Shah (2003) among students of religious schools (Madaris) of Bannu District was 3.61%. In 2003 Karim observed the prevalence of malaria among school children in rural areas of Bannu District, and reported 3.05% of malarial infection. Our results are also in contradiction to the finding of Muhammad Iqbal Yasinzai et al., 2009 who find a prevalent rate of 38.9% in district Bolan.Similarly Hussain Khan et al., 2006 also conducted a study in the Department of Medicine, Gomal Medical College,D. I. Khan,who find that out of these, 98, 20% were found positive for malaria, seventy-five (76.53%) males and 23(23.46%) females.

In present study the species wise distribution of malaria showed that *P.vivax* is present 95.30%, while *P.falciparum* was 4.60%. Similar results were analyzed by Saba Ahmad et al., 2012 who find that *P.vivax* was 86.2% and *P.falciparum* was 13.7%. Similarly Arbab Ali Junejo., et al 2012 investigated malarial parasite and its species in hospitalized Children, who were clinically suspected as malaria. According to him *P.vivax* was seen in majority 43(58.9%) of cases while *P.falciparum* was seen in 30(41.09%) cases only.

In present study gender wise prevalence of *malaria was* studied in the district Mardan. Malaria infected males 52% and 48% females of District Mardan. Similar results were obtained by Muhammad IqbalYasinzai et al., 2009 who find that 75.5% males and 24.5% females were infected with malaria.Hussain Khan et al., 2006 in his study found seventy-five (76.53%) males and 23(23.46%) females infected by plasmodium species.

SUMMARY

Malaria is a mosquito borne disease caused by protozoan parasites *Plasmodium*. It is caused by infection of the red blood cells with intracellular protozoan parasites of the genus *Plasmodium.* Severe malaria is almost exclusively caused by *P.falciparum*. The four *Plasmodium* species that infect humans are *P.falciparum*, *P.vivax*, *P.ovale*, and *P.malariae*. Among the four species, *P.falciparum* is the main species that causes severe disease and mortality. Malaria is the second fatal disease in the world. The infectious disease infects more than 300 million peoples a year. In this study from pathology Department Mardan Medical Complex and D.H.Q Mardan and T.H.Q Takht bhai 350 blood samples were collected, their thick and thin smears were made for microscopy. Out of 350 samples 60 were found positive for malarial Parasites showed a prevalence rate of 17.1% in District Mardan. Out of 60 positive samples, *Plasmodium vivax* was found 57(95.3%), while the remaining 3(4.6%) were found *P.falciparum*. Gender wise distribution of malaria shows a prevalence rate of 31(52%) in males and in females 29(48%). In order to effectively develop preventing method policies, a thorough understanding of factors contributing to possession and use are critical. Government should focus the malaria problem of district Mardan.

CONCLUSION AND RECOMMENDATION

On the basis of present research it can be concluded that the males are more affected by malaria than the females as they are more exposed to parasitized malaria. *P.vivax* and *P.falciparum* are common in district Mardan causing severe malaria. Infection of malaria was high in D.H.Q than the T.H.Q and M.M.C. In both males and females malaria disease were caused more by *P. vivax*. This infection may give high loss to the individuals of district Mardan.

Social marketing is a novel and promising approach to promote and supply effective malaria control tools. In order to effectively develop preventing method policies, a thorough understanding of factors contributing to possession and use are critical. Government should focus the malaria problem of district Mardan.Lower age individual are being more affected which are the backbone of country. We should take practical steps to fulfill the needs that are important to control the spreading of mosquito and also cleanliness aspects to eradicate the problem from district Mardan.

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